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ABSTRACT

Based on the work of theorists Dewey, Piaget, Vygotsky, Feuerstein, Gardner, and Diamond, this paper presents the constructivist or brain compatible classroom as illustrated by descriptions of classroom activities of students from kindergarten through twelfth grade. The paper explores how teachers, the "new architects of the intellect," incorporate three critical elements as they bridge theory and practice: (1) the teacher's creative genius; (2) the complex tooling for instructional excellence; and (3) systems of interconnectivity to frame curriculum. The report also describes classroom activities using problem-based learning, case studies, themes, project-based learning, service learning, and performance learning that promote the construction of knowledge and meaning-making in the mind of the learner. (Author/KB)

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Abstract: Architects of the Intellect

Based on the work of the master architects, Dewey, Piaget, Vygotsky, Feuerstrein, Gardner, and Diamond, the constructivist or brain compatible classroom is presented through vivid descriptions of K-12 classroom scenes and activities. As teachers or the "new architects of the intellect" bridge theory to practice, they incorporate three critical elements: the creative genius of the teacher; the complex tooling for instructional excellence; and systems of interconnectivity to frame curriculum. Images of cognitive designs that promote the construction of knowledge and meaning-making in the mind of the learner are illustrated in problem-based learning, case studies, themes, project and/or service learning and performance learning.

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Architects of the Intellect

Robin Fogarty

Students huddled over the table focusing the microscope, youngsters drawing geometric shapes to create sketches of prehistoric animals, kids gathering leaves around the school yard to later sort and classify, young adults rehearsing for the spring musical, a lone girl riveted to the tale of "Little Women," three boys in the corner laughing at a joke, a freckled faced kid jiving to the music ... these are the scenes of the active learning classroom; these are the sounds and signs of engaged learners—and these are the designs of masterful school architects .

Architects of the Intellect

These are not normal, every day architects who design concrete buildings framed by steel. Oh, no! These are "architects of the intellect," who design exquisite learning experiences for eager minds. These architects specialize in designs with the brain in mind. They are the teachers of children, of students, of capable apprentices. These architects' mission is to design learning experiences that invite students to construct knowledge and to make meaning of their world.

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Their mission is a daunting one. While the human mind innately strives to make sense of things as its neural pathways form intricate connections, these neural linkages are inextricably embedded in the past experiences and prior knowledge of each learner. How do these architects design learning suited to the unique schemata of each learner?

As one might suspect, the designs require rigor and robustness. In fact, three critical attributes (See Figure 1) are usually present in a variety of configurations: (a) the creative genius of the teacher (the art and science of teaching), (b) complex tooling for instructional excellence (instructional methodology) and (c) expansive systems of interconnectivity to frame these learning experiences (curricular frameworks). Yet, when the designs are complete, learning occurs naturally and with direction and purpose, as the human mind intuitively seeks patterns and order and coherence.

Figure 1

Constructivist Designs

Creative Genius of Teachers

Complex Tooling for Instructional Excellence

Systems of Interconnectivity to Frame Curriculum

Just as a traditional architect might borrow the fundamental elements and signature styling of the prairie home from a master architect such as Frank Lloyd Wright, these new architects also borrow from their master craftsmen. They borrow, however, from

master cognitive psychologists and neurobiologists who have helped to shape structures for the intellect.

Thus, the creative designs required of these new architects are founded on the sound pedagogy of best practices as theorized by the masters. At the heart of the work of these new architects in designing learning solutions is the strong influence of the seminal works of the proponents of a constructivist theory of learning (See Figure 2). The legacies of Dewey, Piaget, Vygotsky, Feuerstein, Gardner, and Diamond speak elegantly to the creative genius of the teacher as architect.

Figure 2

Creative Genius of Teacher

Dewey: Learning Experiences

Piaget: Discovery Learning

Vygotsky: Social Interactions

Feuerstein: Mediated Learning Experiences

Gardner: Multiple Intelligences

Diamond: Enriched Environments

Dewey: Learning Experiences

Dewey's (1938) designs embed learning in experience. His concept of curriculum and instruction goes far beyond the classroom walls into life experiences. He advocates field studies and ımmersion in the experience itself to stimulate learning. Dewey's influence is seen in service to the community and in civic projects: reading to the blind; cleaning up the neighborhood graffiti, and partnering with village agencies to protest the pollution of the nearby river.

Dewey's impact is seen as a class sets up a real store to manage consumer products, work with currency, and understand the theory of supply and demand. The influence of his architectural design is evidenced in outdoor education experiences and field trips to local historic museums and the county court house. A Dewey architect embraces a simulated archeological dig in which students examine the layers of artifacts found in a classroom wastebasket and reconstruct the imagined scene.

Piaget: Discovery Learning

Piaget's (1970) work influences the architects of the intellect through designs of discovery learning. In these designs, students manipulate subject matter and objects

representing the subject matter content as they interpret their findings and form ideas and concepts about the experience. Piaget theorized that the learners' interactions lead to structural changes in how they think about something as they assimilate and accommodate incoming data. The influence of Piaget's designs are easy to spot in K–12 classrooms. One might see students messing with an assortment of objects and magnets or experimenting gingerly with the idea of bouyancy as they test various items in the water basin. Students might be stringing and restringing electrical circuitry or manipulating Cuisenaire rods as they master the concept of fractions. Pendulums may be tested again and again as they measure the arc and draw conclusions.

Discovery learning supports the curricular architecture of much of the hands-on learning seen in classrooms today, including the discovery and feedback loop of complex computer software programs. Constructing meaning based on one's interpretation of the data is at the heart of science inquiry, problem-based learning models borrowed from teaching practices in the medical field, and case studies as used in the social science areas.

Vygotsky: Social Interactions

To see the incredible influence of Vygotsky's (1978) designs, one need only to look at the mryiad studies focused on classroom interaction patterns. Vygotsky's theory

suggests that one learns first through a social setting of person to person interactions and then personally through an internalization process that leads to deep understanding. This belief in the socialization process of idea-making permeates the interactive classroom. Student-to-student engagements range from small groups of kids bent over the map of the Anarctica, deep in discussion of human survival to pairs of students going head to head as they debate the most efficient method to solve the "tower problem."

Teacher-to-student interaction patterns bridge the spectrum from a teacher-directed whole group discussion on the changes in Pip's character as he evolves in "Great Expectations" to the skillful questioning and reflective probing orchestrated by the teacher as one student illustrates her understanding of the Pythagorean Theory in terms of constructing a building frame with triangular struts. Skillful teacher questioning, which guides the social interactions in the classroom, is the mark of a master architect, clearly reflecting the influence of Vygotsky's thinking. At times, this influence may be more implicit than explicit in the action, but the impact of Vygotsky extends, inarguably, far beyond theoretical pedagogy and clearly into the realm of accepted best practices in teaching methodology.

Feuerstien: Mediated Learning Experiences

The portraits of these architects of the intellect would be incomplete without that of Reuven Feuerstein. Feuerstein (1990) performed ground-breaking work in cognitive

modifications with traumatized children of the holocoust. His success through mediated learning experiences with these children has transformed current thinking about intelligence and human potential. His mediated learning theory refutes the concept of a static and unchanging IQ and opens the way for intense examination of the metacognitive realm of the classroom. He believes the discovery process requires human intervention from the teacher to guide the learning.

Witness a student deeply engaged in a cognitive task of searching for a pattern that connects a seemingly random series of dots and listen closely to the expert intervention of the teacher/coach. "Why did you do that?" "What were you thinking just now?" "How does this remind you of another problem we did, yesterday?" "Have you a good reason for doing what you did here? Tell me about it."

Then, shift to a less intense classroom scene in which youngsters are asked to think about their teamwork upon completing a large mural depicting the Oregon Trail. "What were you supposed to do?" "What did you do well?" "What might you change if you work together again?" "Do you need any help?" Notice how the teacher goes beyond the cognitive and into the realm of the metacognitive by getting students to think about their thinking and learning through guided reflection. Thus, the skillfulness of these architects of the intellect, is demonstrated in all its glory. They put Feuerstein's theory into practice as they capture "teachable moments" and lead students toward deeper understanding and reflective transfer.

Gardner: Multiple Intelligences

Gardner's (1983) gift to the new architects is his conceptualization of intelligence as multifaceted and multidimensional. He defines human potential in terms of the ability to solve problems in a culturally valued setting. With this broad perspective, Gardner has identified eight realms of intelligence: verbal, logical, visual, musical, bodily, interpersonal, intrapersonal, and naturalist. As seen in innumerable classrooms, these multiple intelligences are at work in various combinations as they converse and connect in the execution of complex tasks.

Envision a youngster planting a summer garden; think of the many intelligences that must come into play. She may think logically in the planning, interpersonally in getting advice about the proper seeds, visually in the laying out of the rows, as a naturalist in understanding the gestation periods of the seedlings, and intrapersonally in reflecting on the results. In another situation, as high school boys build a rocket in physics class, they think logical as they sequence the parts, visualize as they design the rocket, exercise interpersonal skills as they cooperate as a team, and meditate intrapersonally as they celebrate their success.

The influence of Gardner's genius is felt not only in the understanding that there are many ways of knowing about the world and making personal meaning, but also in recognizing that there are many ways of expressing what one knows and is able to do. The impact of this theory permeates the movement in current educational evaluation. A

more authentic evaluation of students , known as performance assessment, is valued as an authentic measure of what students know and are able to do.

Students might perform, literally: driving a car in a simulation, executing a dance number, demonstrating a basketball move in athletics, or playing "Peter and the Wolf" on the flute. Yet, performance also may be more subtle: completing a persuasive essay, demonstrating the proper procedures for a lab set up, or befriending a new student, producing the school yearbook, managing the school newspaper, taking a leadership role on the student council, or running the supply store before and after school.

Diamond: Enriched Environments

In the 1990s, the explosion of research on the brain and learning has brought the pioneering work of neurobiologist Marian Diamond to the forefront. She describes the growth of dendrites in the brain as the growth of "magical trees of the mind." Showing a closed hand opening to demonstrate the flowering of the dendrites with stimuli rich environments, she continues with the metaphor as she speaks of an impoverished environment, slowly closing her hand into a small circle to show how the dendrites shrivel. The influence of this research on enriched environments speaks to the same theory base as constructivism. In both domains, the learner is mindfully managing the input and making sense of the things in their ever-changing environment.

Hallways dripping with printed posters, writings, mobiles, sculptures and paintings; classrooms with bean bag chairs, little rugs and fluffy pillows, books, magazines, newspapers and journals; science corners filled with greenery and tanks of fish, gerbil cages, rock collections and classifications charts of sea shells; the listening station alive with classical music, pop songs, ballads and the Blues; the art center crammed with paint tubes, brushes, clay, sand, beads, constructions paper, scissors, glue and markers; the classroom lab stocked with beakers, microscopes, electrical circuitry, chemicals and formaldehyde; the computer room with clicking keyboards, graphics software, CD Roms, modems and Internet phones lines buzzing ... these are the sights and sounds of the enriched environment. These are the sights and sounds that cause those dendrites to grow and to form neural pathways of understanding and insight. These are the sights and sounds of Diamond's influence on the architects of the intellect .

Creative Genius of Teachers

The vision of the masters, Dewey, Piaget, Vygotsky, Feuerstein, Gardner, and Diamond is easily depicted in the scenes shown here. They have left their legacy for the new architects. This is what the constructivist classroom looks and sounds like.

The mission, however, is far more elusive for these architects of the intellect. For it is up to them to design learning with the brain in mind and to design learning that empowers the learner to construct knowledge and make meaning through mindful manipulation of

input. These new architects must blend the art and science of teaching into creative cognitive designs.

Complex Tooling for Instructional Excellence

Yet, if one examines the varied work of the masters and tries to crystallize the critical elements of the constructivist architecture, an array of complex tooling emerges (See Figure 3). This includes a learner-centered/life-centered curriculum, enriched environments, interactive settings, differentiated instruction, inquiry/experimentation/investigation, mediation/facilitation, and metacognitive reflection.

Figure 3

Complex Tooling for Instructional Designs

Learner-centered; life-centered curriculum

Environments rich in sensory stimuli

Socially interactive settings

Differentiated instructional approaches

Inquiring experimentation and investigations

Human mediation, facilitation and coaching

Mindful and metacognitive reflections

These seven elements define the constructive philosophy and illustrate the lasting influence of the master architects. These are the tools that create the designs of the new architects—designs with the brain in mind.

Expansive Systems of Interconnectivity

Look closely at these designs of cognitive architecture in the schools and classrooms today and one sees expansive systems of interconnectivity. This interconnectedness dictates relevance and recursiveness in the architecture. Notice (See Figure 4) the elegant structures for intellectual challenge in problem-based learning models; exquisite moral dilemmas illuminated in the case study approach; splendid thematic units that thread concepts and skills across the disciplines; magnificent collaborative problem solving in robust project-based units of study; magical personal and interpersonal transformations through service learning curricula; and memorable moments of peak learning experiences through student-initiated and student-executed performances of the heart.

Figure 4

Curricular Interconnectivity

Problem Based Learning

Case Study Approach

Thematic Learning

Project Learning

Service Learning

Performance Learning

Yes, these new architects of the intellect have learned their craft well. They have heard the voices of the masters and have seen their visions. The intellectual structures of today's architects resonate with the sounds of Dewey, Piaget, Vygotsky, Feuerstein, Gardner, and Diamond. The curriculum designs capture the cognitive genius of the visionaries. And, these architects willingly pass the legacy on. For, after all, they design with the brain in mind; they design learning experiences for capable apprentices.

Dewey, J. 1938. *Experience and Education.* New York: Collier

Diamond, M. and Hopson, J. 1998. *Magical Trees of the Mind : How to Nurture Your Child's Intelligence, Creativity, and Healthy Emotions from Birth to Adolescence.* New York: E.P. Dutton.

Fuerstein, R. 1990. *Instrumental Enrichment.* Baltimore: University Park Press.

Gardner, H. 1983. *Frames of Mind: The theory of Multiple Intelligences.* New York: Basic Press

Piaget, J. 1970. Piaget's Theory. In *Carmichael's manual of child psychology,* edited by P.Mussen. New York: Wiley

Vygotsky, L. 1978. Mind in Society: The developementof higher psychological process. Cambridge,MA: Harvard University Press.

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